

MILK YIELD AND MILK FAT PRODUCTION IN FEED-DEPRIVED DAIRY COWS*Sigrid Agenäs¹, Kristina Dahlborn² and Kjell Holtenius¹*¹Swedish University of Agricultural Sciences, Dept. of Animal Nutrition and Management, Kungsängen Research Centre, S-753 23 Uppsala, Sweden²Swedish University of Agricultural Sciences, Dept. of Animal Physiology

In this study we investigated cows from an ongoing selection program where high yielding dairy cows of Swedish Red and White breed are bred for either high or low milk fat percentage. The two selection lines are sired with bulls indexed for high (HFI) or low (LFI) milk fat percentage at the same amount of energy produced in milk (Åkerlind et al., 1999). Six cows from each selection line, producing on average 23,9 kg milk (HFI) and 26,7 kg milk (LFI) at the onset of the experiment were used. The objective of this experiment was to study if there were differences in the response to feed deprivation between the selection lines regarding milk yield and milk fat production. Twelve primiparous cows in early lactation (wk 7-11) were subjected to a 48 hours period of total feed deprivation, and were then followed for seven days after refeeding. The cows were milked twice a day at 6 a.m. and 4.30 p.m. and milk samples were obtained at each milking. Milk yield was only recorded from three teats during the experiment, due to udder tissue sampling from one teat. Biopsy data are not reported here. Blood was sampled from the tail vein at 8 a.m. and at 5 p.m.

When feed was removed the plasma NEFA concentration increased sevenfold. The plasma concentration had decreased markedly 12 hrs after refeeding and had returned to the initial level one week after refeeding. Milk yield decreased within 24 hrs after feed removal and showed the lowest values at the first milking after refeeding, when it was less than 50% of the production level before feed deprivation. Milk fat content increased reciprocally to milk yield and thereby the effect on total milk fat production was limited. The milk fat composition was strongly affected by the feed deprivation. The content of *de novo* synthesised fatty acids in milk fat decreased from the initial proportion of 30% down to 12% and C_{18:1} fatty acids increased from 20% to 37% of the milk fat. There were no significant differences between the selection lines in any of these parameters during the feed deprivation but LFI cows showed significantly ($P > 0,0038$) lower milk fat yield than HFI cows immediately after refeeding.

These results show that cows in early lactation have a remarkable ability to adjust milk production when feed intake is limited and also to resume milk production quickly when they are fed again. It is also shown here that fat production is quite well maintained during feed deprivation, by mobilisation of body tissues. It may be speculated that the evolutionary purpose of this ability is to secure energy production for the offspring.

References

Åkerlind, M., Holtenius, K., Bertilsson, J. & Emanuelson, M. 1999. Milk composition and feed intake in dairy cows selected for high or low milk fat percentage. *Livest. Prod. Sci.* 59 (1), 1-11.